

Partnership for Resource-Efficient Schools

A Project of the City of Seattle and Seattle Public Schools



Recommended
Best Management Practices Promoting:

- Energy Efficiency
- Resource Conservation
- Environmental Quality

A Publication of the Seattle Public Schools Building Excellence Program
City of Seattle Solid Waste Utility
City of Seattle Water Department
Seattle City Light

The **Partnership for Resource-Efficient Schools** is a project of the City of Seattle and the Seattle Public Schools Building Excellence Program and was developed with a team of consultants.

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We would like to express our thanks to the following technical reviewers whose assistance was invaluable in the production of this document:

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*Special thanks to David and Chris for their technical writing assistance.

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INTRODUCTION



With the public's approval of a \$357 million school levy in 1995 came the responsibility of improving or rebuilding a significant portion of the Seattle Public Schools' building stock. Nineteen school construction projects have been scheduled over the next five years. Seattle Public Schools has organized the Building Excellence program to head this ambitious capital works campaign. A major focus of Building Excellence is to ensure decisions made during the design and construction of these buildings strike a balance between the values of fiscal prudence and providing optimal learning environments for students.

In addition, the City of Seattle and Seattle Public Schools recognize this building campaign provides an opportunity to demonstrate the efficient and responsible use of natural resources. The Seattle Public Schools' Building Excellence Program has joined with Seattle Public Utilities and Seattle City Light in a **Partnership for Resource-Efficient Schools**. This Partnership will promote sustainability in the design, construction, and operation of these and all future schools.

Goals of the Partnership

- ◆ To show City support for the Building Excellence Program; and
 - ◆ To influence change in design and construction practices; to demonstrate schools can be built sustainably.
- For a school to be built "sustainably" implies the building's designers and builders have achieved an ideal -- a building that uses resources at the same rate (or less) than the rate at which they can be replenished. Since this rate would be difficult to quantify when applied to something as complex as a building, the Partnership is promoting sustainability through the use of three principles of resource efficiency: **energy efficiency**, **resource conservation**, and **environmental quality**.

Meeting Partnership Goals through Best Management Practices

The Partnership has developed recommended best management practices that incorporate these principles of resource efficiency and has set goals for those recommendations. They are:

- ◆ To include measures that go beyond existing code requirements and standard practices, and are cost-effective (first costs and life-cycle costs).
- ◆ To feature measures that are commercially available and require minimal maintenance.
- ◆ To encourage the incorporation of systems where progress can be measured, and dollar and resource savings tracked.
- ◆ To encourage an integrated approach to the design, construction, and operation of buildings to maximize resource efficiency.
- ◆ To encourage the use of commissioning to ensure original design intent is met.

In addition, the Partnership has defined the three principles of resource efficiency as follows:

- ◆ **Energy efficiency:** promotes efficient use of energy resources while minimizing environmental impacts and meeting economic goals.
- ◆ **Resource conservation:** promotes the use of renewable resources at a rate that allows for replenishing of stocks; specifically through **water conservation**, **solid waste management**, and the selection of **resource-efficient building materials**.
- ◆ **Environmental quality:** promotes healthy and non-toxic indoor and outdoor environments.

The Partnership's commitment to promote these principles makes possible significant progress towards a sustainable approach to school design and construction, and building in general. This approach will potentially conserve natural resources and provide long-term economic benefits during the life of the buildings.

Organization of this Document

The Recommended Best Management Practices document has three Sections, each designed as a stand-alone document:

- ◆ Section I: Design Phase
- ◆ Section II: Build-Out Phase
- ◆ Section III: Operations and Maintenance

A separate Appendix document is also provided, which may be used with all three sections.

Recommended Forms

Three forms have been developed for use with this document:

- ◆ *Design Summary Form:* This should be completed by the District Construction Project Manager, identifying all those responsible for specific areas of design criteria for the School District.
- ◆ *Component Inventory Summary Description:* This should be completed at the end of the construction (build-out) phase of the project by the School District Commissioning Agent and the District Construction Project Manager.
- ◆ *Building Occupancy Profile:* This form should be completed by operations and maintenance staff and management responsible for the specific facility. This should be done in the first year of operation and reviewed annually or whenever occupancy or use change in a facility.

Copies of these forms are included in the Appendix document, Appendices A, B, and C.

DESIGN INTEGRATION AND COMMISSIONING

There are two processes that deserve special emphasis here, as they are of particular importance in achieving the Partnership's goals: design integration and commissioning. Both require coordination among designers, contractors, and operations and maintenance staff in order to be effective.

Design Integration

Design integration describes a decision-making process that brings together the various disciplines that are involved in designing today's buildings and reviews their recommendations as a whole. It recognizes that each discipline's recommendations have an impact on other aspects of the building project. Ideally, by making decisions in this way, building performance and cost are optimized.

Designing and building resource-efficient school buildings *requires* some level of design integration, since the measures to achieve resource efficiency often overlap or interact. The level of integration achievable will vary, however, depending on specifics about the building project itself, such as scheduling and budget.

Even a small degree of design integration provides some benefits. It allows professionals working in various disciplines to take advantage of efficiencies that may not be apparent when they are working in isolation. It can also point out areas where trade-offs can be implemented to enhance resource efficiency. Design integration is the best way to avoid redundancy or conflicts

with aspects of the building project planned by others.

The Partnership hopes to encourage teams designing and engineering Seattle Public School buildings to incorporate the concept of design integration in their decision-making process at the highest level practical in their project.

The level of integration that can be achieved in a project is highly dependent on *when* the integration is introduced. The earlier integration is introduced in the design process the greater the benefit. An integrated design approach that incorporates energy efficiency, resource conservation, and environmental quality is outlined in the introduction to Section I: Design Phase. The outline shows four levels of integration, each level associated with a step in the design process, from programming to design development.

Commissioning

Commissioning uses examination and functional performance testing to demonstrate that installed components or systems and the building overall meet the intent of the original design.

A commissioning agent is someone qualified to provide an independent inspection of the particular building or landscape component or system being commissioned. An example of commissioning would be a review of the HVAC system, which would, among other things, include checking the design specifications for a ceiling diffuser against the actual installed item. If the specified product was not used, the commissioning agent would check the change order documentation for performance and testing equivalence. The agent may also request a

flowhood measurement to verify actual performance or any testing and balancing results. Another example would be where the agent reviewing the irrigation system would conduct an audit to confirm the installed system meets the design goal of 65% efficiency.

Central to commissioning is a plan describing the designed level of performance in measurable terms. The commissioning plan is a vehicle for promoting good communication and documentation throughout the process to keep all parties involved aware of all relevant data and decisions. Critical information includes: the owner's needs; decisions impacting the design; procedures for recording system performance; operational information; and final performance verification.

Commissioning avoids situations where buildings are delivered to the owner and operating staff with little information as to the design intent of the system or operational requirements. This results in operational problems due to lack of certainty the system is performing as it should. Thus the commissioning agent integrates design, construction, and operations by ensuring installation meets design intent and operators understand the system.